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IO/T, ISN/MNSA COCKERHAM, IO/UNP, ISN CTR CURRY; NA-243 GOOREVICH, LOCKWOOD, OEHLBERT, BRUNS; NA-241 SIEMON, O'CONNOR, LAMONTAGNE; NRC FOR OIP - DUNN LEE, HENDERSON, SCHWARTZMAN; USDOC PASS NIST FOR DAVE SIMONS; AFTAC FOR CHARLES BRENNAN

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TAGS: AORC KNNP IAEA ENRG TRGY
SUBJECT: IAEA/SAL: PLUTONIUM "EXPLOSION" AT THE NUCLEAR LAB

Classified By: AMBASSADOR GREGORY L. SCHULTE FOR 1.4 REASONS B AND D

¶1. (C) Summary. A contamination incident occurred at the IAEA's Safeguards Analytic Laboratory in Seibersdorf on August 3, in which five plutonium reference solution vials exploded due to a buildup of gases, primarily hydrogen. The vials, which were 15 years old, built up gases to an estimated 14 atmospheres of pressure as the plutonium solution decayed. SAL officials suspect that a small electrostatic discharge likely instigated the explosion in one vial, setting off the rest. A small portion of the lab remains closed off and sampling efforts continue to ensure all contamination is contained, particularly to ensure the Clean Laboratory at Seibersdorf is not contaminated. Operations at the laboratory continue uninterrupted for the time being, although we expect delays in the near future as the room of the incident is closed and unable to receive nuclear samples. Contrary to news reports, the incident was not caused by "aging infrastructure," although the Secretariat indicates that the poor layout of the nuclear laboratory will magnify the risks of cross-contamination. End Summary.

¶2. (C) On August 3 at 2:30 AM, a continuous air monitoring (CAM) alarm was set off at the Nuclear Material Laboratory in Seibersdorf. This laboratory is part of the Safeguards Analytic Laboratories. The alarm was located on the ground floor in the "Plutonium Stores Room," which holds plutonium reference materials and high-activity waste that is staged for disposal. This multi-purpose room also receives nuclear samples, not by design but by lack of space in the nuclear material laboratory. Shortly after the first alarm, four additional CAM alarms went off in the Plutonium Laboratory on the second floor.

¶3. (C) Emergency responders arrived on site shortly after the alarm, including health physicists, to evaluate the situation. The Plutonium Stores room houses three shielded safes that hold the radioactive material. The responders opened Safe #3 first, as this was the last safe accessed on Friday, August 1. Steel drawers were deformed, showing evidence of an explosion. The responders took photographs of the area and quickly shut the safe to control the spread of contamination. The safe remains unopened as of August 3.

¶4. (C) Using the photographs, SAL officials have been able to reconstruct the events on Sunday morning. The explosion resulted from five plutonium solution standards that were contained in sealed glass vials. The 50 milliliter (mL) capacity vials contained 20 mL of nitric acid (1.5 molar concentration) solution with 8 mg/mL of plutonium-240 that was 99-percent pure. The samples were 15 years old as they were prepared in 1993 in Russia for SAL. SAL received the samples in 1997. The glass vials were wrapped in two layers of heavy duty plastic. (Note: Plutonium-240 is an unstable isotope (alpha-emitter) with a short half-life.) According to SAL officials, gases built up over the years inside the vials, primarily hydrogen. Based on their estimates, the pressure built up by the decaying Pu-240 was approximately 14 atmospheres, releasing about 3.5 kilojoules (kJ) of energy.

One SAL official noted that a small electrostatic discharge likely instigated the explosion in one vial, setting off the other vials given the intense pressure.

¶5. (C) The four additional CAM alarms that went off were located in the Plutonium Laboratory on the second floor. CAM filters on the second floor picked up contamination at lower activity levels than the CAM filter in the Plutonium Stores room on the first floor, however, no further contamination was found in the second floor laboratory. The incident in the Plutonium Stores room exposed a vulnerability to the Nuclear Material Lab, that the sinks in both rooms shared a common drain that is now unused. No other rooms in the Nuclear Material Lab picked up any contamination, although the IAEA continues its evaluation of swipes in the laboratory.

¶6. (C) SAL is taking steps to ensure there is no cross-contamination of nuclear material in other rooms in the nuclear lab, with the primary concern being contamination reaching the SAL's Clean Laboratory in Seibersdorf. Another concern is contamination to the environment. The filter on the ventilation system for the building did not show signs of contamination, which is a positive sign that contamination did not make it outside the building. The IAEA continues to take environmental samples of the surrounding area. While the incident did not result from "aging infrastructure" as reported in the news, the cross-contamination concerns are magnified by the poor layout of the Nuclear Materials Lab, resulting from space restrictions. SAL awaits bio-assay results to ensure personnel are not contaminated.

¶7. (C) Operations at the Nuclear Materials Laboratory continue uninterrupted although delays in operation will almost certainly occur as the Stores room is unable to receive samples. In the meantime, the IAEA is working with the Austrian Ministry to approve another room for receiving samples. In addition, SAL is not able to stage high-activity waste or retrieve samples from the Stores room.

¶8. (C) IAEA informed its sister-laboratories in the Network of Analytic Laboratories (NWAL) about the incident on August 7 to provide a lesson-learned and warn of the potential risk. The IAEA expects it will need outside help in the near future for containment and clean-up of the contamination. According to a senior SAL official, a Canadian company has already offered its services to the Director General, although the official said that Los Alamos National Laboratory may have some of the needed radiolysis expertise.

¶9. (C) Comment: UNVIE will continue to monitor the investigation of this event to determine if safety issues are being adequately reviewed and addressed.

SCHULTE